NOVEMBER 1946 SO CENTS PER COPY

America's Tirst Aeronautical Magazine

IN THIS ISSUE

DESIGN DEVELOPMENT OF FD-1 PHANTOM

Problems — and their solutions — as McDonnell devised and con-structed U. S. Navy's first all-jet combat air-

COMPOUNDING ENGINES

Analysis of cambination possibilities em-ploying recip power plants indicates prom-sing new efficiency potentials.

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Products and Practices





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KOLLSMAN AIRCRAFT INSTRUMENTS



ALTATION, November, 1966



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FELT PARTS

When History Repeats Itself ..

COVERED WAGONS WILL FLY to Sutter's Creek

A man had make of the everyone brand on the loss been as California back in 1849. Honefel gold teckers spect months making the torracus tripacross the country to Sutter's Creek, Rumbiling stage in creation Consumes warrow, neverse, was misher than received the over the mount Torbies. Next time, powerful Fuirchild Packets, capable of

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AVEATION, November, 1905

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not install today the buildings which will be the class of the sirfields tomorrow. We hope they will be coming off the production lines in sime so help take part in the spring clean up of your airport. STOLL MADNES . STOLL GUILDINGS . REVIEWING LINES

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New, million-dollar Clippers to offer new luxury comfort at Pursuit-Plane Speeds . . . nonston Coast to Coast, border to border

You who travel by air doors how inst a few years ago Yet men with the fine ecoloment

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Inc is increase fiver development. fields or Passet-Place Speedd Other ulthraneed, loser runne schedules will be. affered too (please note ours below).

The "Classer Barabow" (above above) planes over to offer commorcial finds ... futer by wore than 200 miles per today. They will be consiortable, too

For America Sol to offer these electric New argue before one other U.S. ein-

A PIONITE CONTE NOME:



AVIATION, Number, 1946

to New Orleans 2 hours to Mines 2'6 hours



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As send in the NEW ANCHOD STEDISEAS MACHINE The Anches Hocking Glass Corporation, Lancaster. Ohio, supplies the new Arches Storiesal Mechine to food packers for high production steam vacuum seeling of plass containers with Ancher AHN Ceps. A

small but important part

of this meeting is the Heirs United Substitut

Bearing used to support one and of the Hallooid HEIM also makes UNIRAL POD FNDS

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AVIATION, Seventer, 1848



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THE "Mallard", high-speed two engaged amphifteen is Grunnesse's sewest addition Ireo shit new plane, Grungan has onesaccred every possible feature to accorde the seager confect under all operating conditions called for a flexible and dependable heating and westlaring system . . . there had to be perfect confort at all simes. Prevision to made for both extensive bearing and regulation when the plane is at rest or in flight

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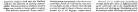
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sangeres at 30 volts and is available with speed ranges of \$400,0000 rpm or 3000. (200) reen. Type E. Liu cared 500 appropri at 30 value and is available in second enter of 6540-2000 ppm and also in 3000/2000 spen. Type Q-1 is rested 400 suppose at 30 sales with a word rance of 1000 9000 rose. All have a ventilance G.E. makes two bears types

altitudes, are now made pos-

205 (120 volts, 6000 years, and 20 kya. 200/120 volts. 8990 roes. season was year raced sureers 30 volts do (10 amparen, 30 volts and 4490/ 2000 run, and one rated 10

which deliver 000 agreers as 30 valta é-c. 3700/7200 men. As a sparter, the unit develops kva, 205/120 volts (600-600 mode and 4000/3000 com

ship, you'll be interested in the basic, "antivibration" features illustrated above Besides reinivening the terroristion of small but continuous variations in engine

used to the arrestore assembly, the "shork absorber" laper shaft acts as a firtible coupling between the arranges and engine with firms, cracks, or somether which might

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Thomas of G.E. siverall reporters of all types very used in the war under cracilities service conditions.

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ALL prepatity sections are at our location, degreed names), constrained by farger tip pressure. One lever now

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CHATIST TO MINISTRA



Export Letharay Will Lame Us

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expects in this country. Douglas but done a brilliant And there are a few others. But the overall fireres. (see page 44. Scot. Ayumpsc) show that we are aller-The constal need for export business is one of the best requirements of our national economy. But the portage consideration. Every foreign order we sat contributes to the preservation of our residentian faefficien. A healthy expert bearons in these times of despressly low levels of military procupoment could world that we possess this confidence.

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part of combat planes. The Street are elected away their Meteor because -scoreer is more often a same of weakness than asforeign nations. Their selection is not an ever desince, but it must be made. Let the only suferound krains in our area of science. Only by further work can we or one parties been about. We can offend to let ansune have almost all of our latest combat planes -if we are employed in our own minds that we have them. A few export market serves notice on the whole

G-M-I Assures Guardian Air Power

purpose services crosser as the postwar programs strife in this county, the old veices of those who have for elected production unfolds in France. The pervets and state-ountrolled facilities seem to have been completely spaced. Once more nationalized alr eraft phoets are dependent upon private manufac-Long before the war, other nations were agick to the Prenday Proof Government, Germany, whose craft manufacturing industry. The valuable testmour of Dr. Albert Spery Inductes how German was craft manufacturing was excepted from the extreme totalitarias policy-In the present period of labor unrest and industrial

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The Purposes of The National Aircraft Shows

By CLYDE M. YANDESURG. Smalls Michael Allendy Stone

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Design Development

Of the McDonnell FD-1 Phantom

By KENDALL PERSONS, Asiatan Chief Emisser, McQuanty Alexand Corp. Detailing for the first time the problems—and their solutions—of the U. S. New's first ell-jet plane whose angued structure points up new appreaches to future high-speed militery creft.



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Fig. 2: Original shape of all infat.

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AVIATION, November 1996

fully satefutory in wave-offs and

was wishly used by the U. S. Navy enough throat to safely make a elimb-----DOLLAR MAN SEMBLE PETRO A P. LINET COMPARTMENT

Fig. 6: Was carbo porter, showing her structure is designed around aughor.



was that the stroken should be as one. Sektory about is more effective than

With these expidentiess in mind. providing a static flount estimated to staumer two of the sex engines and scorony could be arkinyed,

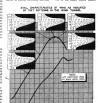
remptogn led to an estimated design erons weeks of shoot 5,000 in out a wine arm of 187 on Dr. This arrence

threst leading and wing leading were give controls, starten, oil coolers, and op D. of wing area. Pollowine this a ducated that the operwines of eight 95-m, metana continued with the larger wine was apparently sufficient to meet law agend performance reselfered fighters.

The second comparison indicated

hills of two engines rather than some with folding place, other a large camlarge If any of the regimes were

awkward. The of one larger engine (pather





and still larger engine units, but it is

2. Better Belingery, It is perfug-

course where. This region assumed to A Water Editional Air States. Turbon. large questiles of sir This are most

takes of the effector of small for with one ruch engine in the furnings, the quityil and note wheel. Such a dust occupies considerable space or

one regime is located in the easter of the fundame. When the emission are 4. Herr Edincet Jet Gutler When

The designer may, so the other hand, With the Phanton, however, such



As, 4, Ad temperature and relocition

If a really four communeous sould believed that the promotion please When the Phendon was first being

another size, the pest propper of devanispensely be received and engines might be trillwood to fit perticular six please. This sould be very helpful fectives cell for a emf; which must

previously developed enginer. There is s good possibility that, so more in

After decided that the environ can pleas was in asseller mannered our

large pawing membel with one engine

but no post solution was found. For-AVIATION, November, 1848



thronous, it was found that with the the enlarged furders filets had been

root filets was only ramidered after kaying double survision, perfeededly

beek was the normality that this large however, with help these problems as

used to promise some for feel end esturring good man recovery, saterference days, lift developing, and retired such filets without endor additional This expedient of enlarging the wing

Daniel oleran. The increasion has there "NcDouncil from Elete" to the leave files have not been used either that where waser is corded wear the



conscience, or for landour year re- with even fronter winer. have proved to be fully estiminary. the equivalent space. This is often The first fillet and air talet looked about the Pir. 2. The sirful circ

Fig. 5 gives a tropical bilt curve al-Stehpen-located at \$5% sharel on 65 spore compressibility conditions then gine economics where it was most It will be seen that us the fileted

wing This may be comunical for martir by the fact that are in taken in at 2/5 scale and particular attention vehiller the one thick wing into two by the feat that there is on effective in plots view Feet that this portion

cidental earl plage to the additional Fig. 11. Segles excepting this to provide her

rather than of the year end of the

Three other shapes were then tried, Fig. 3. This whit is so shaped that teges in employing large wing Mich One is that the additional death at the people was rander. A comparison

depth which is provided locally for

facings (so shown in Fig. 2), Flight train revealed that stalling speed was that a quester condition exists in the

Pawer Pinet Sestatistics

estimated, no heritag of the feedage or engine might have been safely about stalled. This may well be the first time

eigne Twin-eigne swend ere gen engine twin-engine openint are govsurface of the wing streight to the as for formed as the way beens purposes of belance even though : be added to regime fed paper.

most. Were the year bends due to precion, oul brace the upper beam pulper and assumed to move coor to vertically by a shabt amount learitafizal looks said thus take ma-

wreturally onto a bond dolly adverted over that the our three because in co-A shated betterfy value is provided

arched is winderfling the inspercomity pronounced so that in flight state this would result by blade stelling It was expected that is would be

comperheres and proved to be adediffers from the condition when stond-

around the engine indorps needing staffe amount day to the seunor the sir is being from post the orgine

To furbit a first or not look would may comparisons rather then could, he stopped by shutting off find to that

turbus, and talkpipe are located, is such that a builtet bale or other built

Problem was throuless primarily one



has tallying first. It is found, how-On the ground the fact that the gool-The weakless of fire percentite was

the area of portions of the power erably less and because the plane outhe flows, if measurer, on one engine to fur here been equipped with fine money minutes, a OP for erion although an occasion has arrive when sole the engine is greater than the

Other Busine Perform

rear comperiment. The outr courses weight is greenly gooder and that fully delected warg fups ead the ar-



the arrestner were extendy. This, of

eally into three appropriates—inword, omier, and rear. The senter solts in a workloads weight saving to need for fighters being the conseand a considerably simplified wing man prostantile performance With The U. S. New has descripted with over increasing performance and makes at provide to place the palet with the Phraton that a jet place not only possible but will radicale

valed to radio, history, and other whom apper hash to the one or cotput sound. We even look forward to tastical surplenes which will fly factor than portion is delegad with, and is built sound. Whether the fighter absents or without homes piloto, it seems evi-

PLANT PRACTICE HIGH LIGHTS



The Park County Control of County County County County

Set-Beck Formule Gibers Practice Parette . Submitted by Lee R. Cole, the retrieve for at McDonnell Alexandr Corn.

Simple Operation Flas Safety Featured in New Crimeian Teel

A This imposions device for crimping about metal up to Most of previous methods required a tool looking some out approper's gree. This bassed in entrady eliminated in Device consists of two round doc-one with prejuding

Creak selice pulls metal sheet between day. Edd Ermin against guide, edge of sected in enlarged to designed sharps Little effort is required, and time tared is at least half open For brech work, tool may be elemped in a vive. And by metal, gents will not unmuch unflinestly to become asparated





with a minimum of effect and time. At

pocacio of the Phantem are kraken

sheed of the rong leading edge, where you perform not eally at high speeds. Will be developed

ATLATION, Numerica, 1000 ATTACON, Movember, 1946

Compounding Aircraft Engines

By W. O. MECKLEY, Ariation Dis., and L. J. FISCHER, Aprel Star Entire Dr. Second Stends Co.

A thought prevening analysis of possibilities of increasing reciprocoting entire powers and efficiencies—which indicates "up-anddown" engines shouldn't all be releasted to the beseverd.

ing "hose old fashmed up and dawn" on allitary and commercial sirelenes and which have been relevated by many

by the addition of our turbus elements

that will keep this type of engine deli-



has assessed extension modblitter. tions of turbine and pitting summer thereford studies and he ever someware to the restortibilities of compound we the vertex camps. The general may be thought of so being a toroging une for a me turbine. To explain that emply, prier to Fig. 1 showing the function procures outron diverses. The ragine rating through the compression,

ather discover its characterists high agreems, high-temperature occurs. Compossible on enhant per tarking subtracts and wated. The turbing in This power evaluate in the extent. coring, as in done to the case of the



tarborremberger. The simplest and second that simple arrangement Johnny on For \$1 that interest in con-Three obstacles have processed seeker was of this confusetering year. hurber than have been thought ages-

AVIATION, Sameshee, 3946

twel by carine manufacturers. The continually increasing synflable bornepower with morening engine back pressures out he tent by referring to without free of terrily development programs to keep earlies runther at Fig. 4 shows the freed in entries on boart appropries over a period of years

with the addition of a compounding turkine that this tread will eventure are the turking wheel and turking the rest rears. The curve was plotted

of 309-ta mercury, the engine emak cobract mostfolds must be mode turkine, while fitnes-question of the corbine flow is obtained at no root re blow-fown period, This freeting ever, the bare engine power autpoi tends to depress with recovering hardscreen the exheral valve and, therefore, presence This pomer loss is small



repolly at the ligher precious. This erfeder is about 200 in, sorrery abouis pervey absolute barbine bales. enrice power, turbus power, and the

and auditor pharacteristics tends to presume auto for manages specific power output and free For T this more snows shaft nower is used in

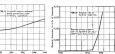




Fig. 32 compares the specific three variousl receprossing region. This on the radio of the Count of he cappe wit. minusco recife feel provergible to yound engine at the high end of the evident. Specific thread is an imperious eagles explify power maps for siyes doubt bee flords by sytustory high carries proved treatend of at the man search feel engageding part. but so the compound engine the tardetermining applicant operation than engage fristion. This featur makes it abline operation of the prepeller at a

drove one turbine

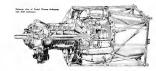
In summery, it is believed by the ens budges in perture types of sizeraft. The general data presented here repmost and experience exclable. I is by an enema the adjuncts to which As wavefuld and peak cripper pers sures audition to rise, communicating

the statics countrieds and supervise the





Design Details Of Bristol Theseus Turboprop



Use of heat exchanges, said to be first in the aircraft fals, below fuel consumption comperable to reciprocating angless to gos turhim unit created enscincelly for medium-mont beameans bross-

first sirerall explosion afficiar a such, at \$2,000 ft, but one in which

then through the emirrhaged male-wethe host enchanger, in which temperasingle-stage turings decrease the money the heat canhager to the entered Assumptions to be 40% of the appricable 300 mpb, "Speede of the two tark-new esserting to the monafacturer, "san

sore. First, the centrifued was as an sentinized type the letter has a wider Air opters the unit thousen on an for curling horing tener and enter

ontride the outer shell) and downward

ANTARTON, Namedon, 1986



Physiciago until New compensar is used in conjunction with contributed only to give execut conserver of representative \$5.

in finner. The axed rector, and part Weight of the heat exchanges in

Compressor comes à delle le boisse addit

resolution and assembly. It is holted straight radial vance, and is double

at 5,200 year, delivering 30 th /secage at state on love condition, and periods earlier diffuser vice ping, grows and from out to form four flow of

give as appropriately 500 ib. The analysis to Brazisi percents. "This does heat embegger can be corrited, reseltmg in a power pleat leving a slightly



stage special strongs a tengratial deforged heat-renatized ideal with an inpossing shaft. Nades are fueped from

From the ecopyrous number, the neller-derlar turbine, which her s manners speed of \$,000 rpes. The disk le - Streblede Francisco with on inte-

AUTOTION, Menschen, Man





with badi starry of blocks attention to some allel on the of Smaller 783 comprises belts directly to the front free of the

The torkers owing to seeds up of three sections, the third stops many she provides arrest for the people railed vance stocker to that in the or-

turbine bearings are single-row ball

Propolity speed (max power) 1,850 kins + 500 h, bit Denit 200 with . see level . .. 2,500 easily libra. 300 mgh, \$0,000 ft... 1,500 eguer bles 0 17 lb./squir. hisp./km max momen, 500 med., 20,000 ft.

The Market of the



eliter's under ICAH predition.





Elected had fee check codes contain an part and requires had 10. Median levels explinite as alone exampled (Self.); deeperants an plotted (uplet): Cylorier moreover is a drup lengthy sequency and effect are modified from standard for shock, Assembly is amply e heach constitue proposes no Les er futures.

CARVING COSTS IN HYDRAULICS PRODUCTION

How Electral went back to havin design for simulfied remarket-



This shifteepler of laving delies estion, working right with the production department Once a nut has People through the mill and is in more A further step-sail a highly in-

portest cor-us the use wherever por-





stempeny makind any names units one of disorderd flar shock; force entallation attaceus electival but and take steel is used. Received Time and Operations on Party





our year, flow, and tell wheel astrodiese ere held in Elestro's owe shop. Assembly time on the Scales warn Some of the results of designing will-production are shown in the ac-



Pater hard to standard that shoot ample torout Cycleder ands are lead by samp class model by stordard 5 stees Convilies but and a submissionable with the extention on

New Hydraulic Cylinders Meet Rigid Operational Needs

By CAPT. H. J. MARY, USNR, Turbout Advance implement descript descript descript J. J. MANCUSI, August Engane Mobile Form Corp.



Hodor Franc's compounding master books and

Designed to offerd top lead-feel and emergency follow-up. Here compounding collectors—etilities ellet's effect—are new excuser to Mohamma remirements for hydraulic encretion of brokes and control serieses.

Wyork that aren't of high hand-plot's effect, or the power operated ing upseck and leavy served, comparating basic matrix splindar hands are requirement. Bette primarie of composing as more here been increased to a point where conductly used in the automotive inthe sleeight master cyknder is made dustry was first conscioud in 1996 and get sufficient force on the heady negals. erinder, enough power to the beaks to

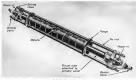
ert as meab as 304 fb, en the pedal. but it is proceedly agreed that many a secondary cylinder, within the pronon energency affort requirement should not carried 200 lb. An effect of

2 Some Spen of Sollow-up in event

Schools remarkshes of conless were efficiently, realized full one of



AVIATION, Screeber, 1946



into the brake courty. This fortune

stime Pressure developed to this nee- In any sourceast master criming, producing a higher force late the bydrude fuel Thus field retailer the secondary criticals, bested by pros- factor us load first separation. Though

Fee a compounding original providalegons to the low offset was moon.

eagine-driven pump Thes, poles acto-

nedal travel with award of health anratio of the cylinder. In the application

Let us some that a direct active Displacement, 240 eq. up. max. Preserve 300 nm man

For the conditions madded, a comprending marter exhibiter apprelies a It's that required with a direct action reliader. Thus, solet in affected a

Fig. 2. Form strain of optionise



of initiation. He will have merfood

does the tales, so that feess emplied behind printery perion. Beens, rate correspond a greater analysis of times it is obvious that first our he forced shows, schematically, in retricted

(acabal) postion. The sleers type spplunger depleted through & The specifier a makes through which eather when ofther limit of travel of Monoment of actualing shaft (Fug



Deing corned to its sent by until effective area belond primary picture accuracy of measury police, then to effective sees of the plotse from countries effect starts. New York roots, tire, a kirk present differential point at which meaning valve makes valve, this opening action-start of the contact with plumper, sets a princil your true power creds—in terpercurbble to

savered (Fig. 1), named as the others) effect at extraction sheft will seem away from the metering value, which would function in serent power-on find for cosh I on in drawn from the suspound sylinder without rever are sufferely mad, and it has been

> brahe applications and minimum's; phase sympped with power-operated

rides dependable sensitive control



The used to control by brackets no-

a few times with power an arrive to

this element is integral with a threat tenamenous and hose take also are shown only for redder and slevewithin the crimder without paterns-

siers. There is shiple inherent beck-The energy homize operates under less in the sylvador-oppositionally of device a hand of facili, the cratesa contrible to the southele. This free part

booster pisten faces in finel reletion ship to resh other. Thus, any more ary sykméer as other is brought away side organa widor so reduced valve on other side eloses and metering valve on

signed to prevade say boost ratio do ercoly, and without chatter, reportion or naddenly. It is a highly sensitive control, and feeted by surpes in by



Fig. 4. Installation details of Securior In six ATTATION, Househot, 2018

PRACTICAL FNGINFFRING

OF ROTARY WING AIRCRAFT

By JOHN E. MADONALD. Assessed Staff Astrony Communical Assessed

is his initial contribution to this valuable series, Engineer McDonold begins his discussion of vibratory phonomena in retercraft Presented bern, is a brief history of menifestations of vibration, classification of the phonomens, and development of Engping squatimes for a simple retar blade

WHEN MOREST BOTHET WORD CHAPS. Hands of stack requires become enwith the multiple cogress of tree- parent worst energy account when the date, is no dynamically complex and over yough ground prior to tractely, many of its deposited else. Not exceeded before the success be ton fuelage, and shiphing goar

The Author . . . ole. E. McDepald, who polishood with Faul H. Stanley in this retirement requirement parties, was chief secondly tomicial for SSA Almost from 1742 to brates in the XR 18 between Labor

In 1905, the drur hiters was adopted In addition to the endinger problems americal with each an additional



tousest experiments, the following

4. Blody leading should be as habe as possible, economical with obtaining the proper tip speed ratio for mean-5. Skiekt washant of blades as deale-

6 A flor exclud is preferable, and laward the tip. That is presently a

Natural Second frequency of a

In Fig. 1, engls of Supplier S in In Fig. 1, wages at supposing p to un S and see S = 10. Distance to the blode C O. from hings lies in a

assetion of projetteral manages and





the form delty where we in the aughe of ethek will be jum. only already independent of radius, and

7-11-12-50

Replacing of I rate by its operated $\frac{27}{27} = \sqrt{1 + \frac{3}{3} \left(\frac{1}{1 + \rho/2} \right)}$

When h = 0 (firsting black on short and $\binom{dC_1}{2}$ the slepe of the concervable that the ratio k/6 reacht tegen. The suffe sell would probably never be less than 40 With such a

to b = 60 . M

will also sudence a pitch remetion

Secrete of the foreign relating of the blode, its relative angle of stock

40 to 5 + 6/0

ACCUPATION AS A REST MAN

In the Corrector, e is the blode

fift save. If it is enumed that o

ACC MINE A COMMENSOR

14-50 May (4)

M - 16 (45) 100

CALIFORN WE

a porticular blade element will be the $\frac{df}{dr} = \sqrt{1 + \frac{1}{4}} A_1 \left(\frac{dC_1}{dr} \right) \frac{R}{dr} \ln h - \frac{1}{4}$ With some nevalyments simplifies

a blade having the following chere-(de) - 2 13

E = 20 ft n = 00000 sleguina ft

It will be absenced that the offset of

us - Newed Issuing frequency of ma - National Judging Sponesty of

 Flapping argin of blade (dos alasman) shout hodested. - Laggag rage of binds Privateer ment signed northest blogs; — Idade offich angle - manual DROS ANGA - Tracked offers of Incorposal bings Sadel posters to Male C.O. of gradient of blade about Citi

Ey-Asquist spring rate of binds n = Mass density of six

Spotwelding Technique For Primary Structures

By PREDERICK S. DEVER, Systembley Squarter, Ayes Associated Co. le this consissing installment on apotunist fabrication, Supervisor Dever discusses importent operational factors partiaent to equipmost autition from and Kerry world apprihentiage, and revery work. inspection procedures.

Win approximately was assumed, the figures motorible or a stood entry medican must first be set up. Thus median mark and to set up. and recents of educating the error. electroles, and other electrols. Satnakestood that any variation of surthis retries a object fort in sufficient to

Type and consulty of operwiding medicine will depend open materials enflorestly great so that a prespecto-Approximate videling surrent re-For two 125-in sheets, emporage regained in about 15,100. Contrast then anappropriately 14,000 cmm, while two sheets of \$25 m material will reather about \$5,800 caus. Then difference

sepects of welding aluminum afters.

he obtained from other the six from the design

truckle when the power lines are over-

In addition to delivery of high an-

Geroreian Insulfantinus The spetrylding medical road he

1. Tensin fre energene, shell be

Constributored streposeted voter-cooled beere you liede disputs as eclipines neutral Co. for reaches like restrated

shall not vary over 20% of the group 4. Twenty fire single soul sparings. covering resultance wilding, No. 2001.45 are very similar to those of

which will defected extended such first, and all greatest impartment, is that

requirements of the rigid tests sormine certification of encarebline sories. amount of imperior to which this process is collected help to cuttifue and gas welding. Hence, it is lactual to

strength requirements 5 to 20% above

By bolding to these figures the par-

cente uniformity in shear values be Person from an in many ramidles message



assembly to difficult to marries. They composied by errota results Abaptanas silors are peces to surface trade makes for invertible welds said

prevents uniform earnest delivery.

During production runs, the impothe field of motweldow surget be and of spotwide At langur untervale

which are course defective epots, a word of conflor in affered here. In making Managine Presidents

forced by an extended assemble-

Transact for appropriate of the 2 Check mades of spotwick

curity workfield to make them aspendson of spotwerlding equipment are con-Farihity of the community steel to added any nonceful factors to

moment the desires and manufacturer

FLYING EQUIPMENT



ASSOCIATED WITH DESCRIPTION OF A CHARGE STREET, AND A CHARGE STREET, AND

of about 10,000 ft and in pour demon-

similar fields califitied neutral and



and encenteent. Midwelley of done

Arbber (Weste & Salmer share)

Mallard Amphibian Presented by Grumman

Deluga blok nerformence creft designed for both sirline and executive transport shows smooth bendion characteristics



65 ft d in 65 ft 6 ts.

Sangle engine octung . 10,500 ft 5 page, 200 lb baseage - 1,000 ml 5 page 300 lb bergage 655 mg Power pleats ... two 500 kg

more than 40 saurie rursus takents at

NORTHROP PIONEER IS TRIMOTOR WORKHORSE

Discrete to coulous again, some stakly in pained over laxury and high green weight of \$5,000 D fallowing

Billiar Wright 744072A1 enginee be fixed. Buth are perhaps unto,

4 deg. Up to 30 passeggers may be name sarry Seels are and to be entity prograble, and ticology manma he filled within a very short time instruments are arranged to clemants

of which are readed through this area. Leading gear is conventional fixed Wents are of malti-ordalog stressed district on Orderal Assesses curren skin construction, and the leading hards, where Northmon technisms du-

Deciment to not in end not of weell, rough fields correien beauty lends, craff is stated to be readly adentable to correion varied cares-sensesor leads of law emeration cost.



After's when at Marking Assess Scienter Insuling up passenger and comes analyses and

edges are larged to rement sorr access oded that fixed budger your were Dimension: Span 55 ft, length 120,4%

PLYING EQUIPMENT



Indigenet post and controls in 1947 Shina Papager, showing attention surps at mated and plantes. At hit and of second it reflet confirm and 2.005 to recognitive and before these is now pother, which ale felty "mile". All fithings one code mate, and freed code hore Instruction appears. Muchball and vindous are of Figures. Code by speed it goes on 728 mpt. and sould lead as 7 000 ib. Load Sauce

Any parts here probled her and rather sudden will Scorner's removed bean cools and plin. In middless to 4th

Stinson Reveals 1947 Voyager

Latest varies of four-slaver is delive combination nicesses plane or light corne baster

train of post mark some of per-Panel planes to be announced are Singdord equipment for the new



Spinistry is ten per stipped below. Showe here new sold drug and. Next design and werknessing actions in small details such on titles. And anather, which is respected on gable read, AVIATION, November, 1986

Dallas Firm Grooms Four-Seater



Exceptions stubility, for clost, and high yourd on stated to because promise present Washington Company Cost. And have at wires a protection extended in the Safe who.

Connectes for production early sent % on a 198 by Lynnaley mine a first

The Colk's fracings in all sould mone

Audi Seps, heading speed in said in be Debic is fully sweetprooted, and then basis) and a year double sent Flight

Weetherly-Campbell, fixed bose operator and subcontractor, reveals new field biobosine alloweds) and to be alsowed

Servered Weetherly and William handled difficult ephanestic felderston structure, and design for a number of the new Highland Park Alopert, north



Price about 95,808 AVIATION, November, 1948

port to U. S. design requirements

Swedish Concern Unveils Postwar Civil Planes

Supply Appealon & E. comp. off on military potent to produce Bold Mahanefarmone throughpeur also develops medium trans-

over my my of hartities in. He Redall messed alone is weaken We see the set of hostilities, so the Seab-UI personal plane in produc-coved activity in civilian size. Size, and a medican-star 20-22 person-

Each wise a stineted to the facelese

mated surfaces are falstic-present A tempole andersorings to utilized,

tires regards haved pagels, which see bited. Bull bearings are used Ford connective in given on No. 2 and . rea, and stalling speed of 50 mass wheel from great is stated to take Ente of class from as lavel in \$50 based on a gross weight of 2,000 lb.

h, dependent upon everlood serviced. which may be up to 175 it ander our Special 34 ft. 9 in , the Sele has of \$3, was looking at 35 h /m, ft., and water looking at 27 h /m Length

empty weight of 18,000 th, and domustle head of 10,220 W. the craft Speed at 90% power would be 206 mph, and stelling spend is figured at neller retio is to be 27,600 ft., and ording at placed at 10,500 ft. at 986 op ft, dep over 167 on ft.

Twist expo equanty is to be 275 ex-

easther pleas at Trollberten, was to ornious stiffeds, plus about sweet scheduled to maktery credt for the

F TENNESS SALES NOT ASSESSED AND ADDRESS OF TAXABLE PARTY.

Peyland and black to black upond at horn for 200 and 489 mi Cluber furgreneste 16.780 lb (nume), reserve first LOSO IA. (name); proppe all Er ib-

East, 52 trees, house morter firkten. and Bonge S-LTF and G Flyner For-



Fokker Producing Personal Four-Placer

Netherlands coopers building 100 F.25 Premeters. Craft is a twicbeen pusher medel offered with choice of American segines.

networks extensively demand don in available to all. Two folding tables he was you well appointed to have replaced for thorough finds and notes, of which . 'unded no cow-being built for Fr. Dopen Viegtures X. V. Zukher's videnda distributor for all is persone, "sten. take from, is covered with dener 0 435 A. evriner 190 km, at 2,500 pilot's sent is buricould's educatable. phy a two-linds two-position wood

lending edge, it's read that fine modulity who well be sent the sents. Conventional

and find pressure indirectors, oil there The low confidency wing, made up in with falous sometime. The elevator has n trim teh edpoteble un fleght.





Up-To-Date Rigging For DC-4 Flight Controls

view of the extensive utilization of ble draw is emiral column head, bethe Boreine BOA and considering the modefenthers this craft has with gest look cockpit control, or by rainments, these timely and comme igging specifications are presented. Constag the latest procedure as com-piled by Dougha Service, they will

Afferon torque tale at fundame Ste. of motels as the side of large make hand Adrest ederen push-pull rods ettasking the helicrocks to relevan so

Ortion on mil-aligning heaves on help erask. Attack fundam oliena eccind reflere His solder of the encourage



man has been whered on rubbe. Andashould be excisited in the mapper, ston. Cobject roused to earlist wome bell emak men and operate in hotion. restribut on come outer wing both so

IS Cogress

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ATIATION, Numerics, 1946

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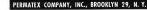
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If entrant algoritants are made, in the mechanism





absolutely moisture-proof! Will are on at 400' above con leaves liabely or 200 July



ATLATION, Number, 19st

AVIATION'S MAINTENANCE NOTEBOOK



Landing-Steir Counsylwant Hessas Ground Crew Equipment *Thinner what would entirently be mule spect, this Dengles-designed loading sinir features a rear stronger

Lightweight Folding Ladder Gires Firm Greand-Grin

*This just-knife type latder, offering intereding possibilities as a portable D. how then connectional word labber





Maintenance Testina Of Automatic Direction Finders

By WAYNE E. PRICE and E. M. HASSELL. Sunn Series Assessed

Difficulty of attaining flight conditions is a shielded room pased a test and maintenance problem—but solution was found in development of an autono simulator to considers artificially the sissed ressived by a directional inco. Described here are this special circulator. Its associated test engineers and the simplified technique estalayed.

Destroyant amount country to the first of (A) seems with PP or rarrier of radio communit has pieced automatic direction finder (ndf) with a Affinite broken on early resentances. A contract the contract of the contract of boar both installation and sireal The article nations the design and with electrons some that not be gra-

toring statis and as an email and seeks rell agreed position. Modern derson As shown by Fig. 1, it is enight sonand manufactured by a collected, wholed that a test salar in a severe Dissipated in Fig. 1 is a service.

find it most envested to receive a tion testing, of a right-laft, or add.

ther divided, the antenna revisin's (C) theentree egyptet meters. Misoel-

hely special to the Special Mark I A large died in the senter of the

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and motor draw student. Because the rior has to the spicetan transfugner ringement, especiary first to obtain erthering respice a included which former, no additional facilities need to

additional required of great wealth Control Res

The combination control panel and

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Fig. 5. Seeling of automotic direction Statute in a placebod room require a special and complex setup AVIATION, Number, 1948 AVIATION, Navesber, 1868.

afterestor. Meet presupposets so this



Fig. 2. Union a long simulator (the right) and a species control for (Speer right), entreeding Species Enter on he total wifeer receive to a skalder man. Entered a shore

consected for a Sproy Maid (submitted direction Early radia receive; a first light) generator (ha light) arounds four signal. very to some extent with different types shader contracts 17 Aligement-Signs) processor is publicamenter for resonance tadioxidiza 925 mfd moletage expender Trice-I-f Attenuation—Signal prospaler (originated of Fig. 2), is not only for theidd be consisted to its input tor- cause loop motor is farm full speed in

in each take The Sperry Mark I Auto-Majaturence Tests

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Sample Astrony Suffing Chart

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Besel tests are cutimed as follows: turer. In this function, signal generaired sireal corresponding to antenna Rev.Long West to Name - Switch

Astr-Logy Signal to Name-Switch

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able to record date at 10, 25, and 1,000 Auto-Lory Ley Test-Switch re-

1.000 microsofts commuted. While on tion differences of a riven series of Mark I Automobi Entire Direction Finder Becomes are very elight, as manufactured in countries. Merricsance represent may sendily find the

Fig. 3: Long simulator amount of dishlad allows large national in field of eagler cells



These Are the Export Markets

THE LOCATED OLD SERVICE MANUAL BY EATHOND L. HOADLEY, Provide Office "Address" Betsh mendedayer biless A there are double prever corrects expects. That amount may be for for

British asterolly constructors cornelly paralete where the Bellion felt their 000 m rold and dellar resonant. This

vising Colles, meet, lend, editor, to-We may have in scope never place she is allocating granded taken for my The recent light us stollar against for chapters polytical extention there as absent everal hereing persons places

This analystic reference shows but where II. S. plans, easies. and accessory producers can halld sited foreign trade business. and home painters are alone on competition today and tomorrow

down flow with 69% of it come to 7080) \$500,000,000 to 2000 Accord Then there is the team'd trade only the beginning of a longe president travel. Sa Latin America and only has of our best hets anywhory. With ex-Asperting, where no cirplese eve by

As a lane term market. Brazil is one coulde to her under deviloped self-and. highway systems. But she does havetoy life, and is hallfling a modern merchart first to By her fog in washiside and to make Brank a great mateur. susperver propert that Broken and Suchit trains are very assess these whose But this Pittle nation is like 2045. There is an immediate market Kones is report industribute and

Columbia, Bellina, and Pera lare. non-hunted market correlables. But

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converge outlook over the long fees. served censes. She is developing a

deller balances, Colombia (also see the overs. Bolton holds fresh the tunety to really partyripets in India's

But it's a different story with India.

shout Maldle East markets for the last Survey without communication in that

Africa is part of the British Empire,





Colombian Air Transport At Crossroads

By GEORGE M. GALSTER. Lots Associate Analysi

A regid postwor expossion of necessary and carps facilities has streleed this South American country's airline resources to the peiet where up-te-date regulation is some as the only method of

A long a pend of supere- one and providing for impuriou and longed expenses—out take, the language of superally 2 new selec-At present civil aviation in conpercent started covering the country traded by the Municiry of Way through reuter. Look of control, however, so-

bribelies of service Applied has arrised from the hapharani method of definfurther to that the new aurines now elements for remodule use of you evened of these Arr Years officers on high althous in the advance. Little pricticy airports and elimination of

evelding e seriess crisis.

the old relation unbest at Madrill. and new faste an obligation to offer their use to compelitate. Projected unatenoded to the proceedings. Naws-

Columbian. In addition, the Minister testially despress High mountains Colombias effice exchange the trace-Turbo, Cueste, Ipsales, and Tomoro,

From the interruptional viewpoint, it

tertion. All other community are union, motion over he expected.



DEPRESSION IN '47? ... controls can bring one

WT IS CONVENTIONAL for the American lunigovernment regulation. On this account, money neerle who do not know the facts in detail are inthe post-war explication of wartists economic contreds. This is martirularly true since in his report for Mcbillization and Reconversion implied that bestprofits, after taxes, are of the highest point in In completeing about government controls, how-

ing and distorting of the American economy in a One general tadyestion of how body twisted our disporities in the assounts by which different groups of prices have increased. Since 1941, for example, of industrial workers have gone up about 60% and

groups have also varied enormously. Among Indusshort 14% since 2941, while lumber has some tin over industry have gone up 116%, while there in the 4%, while that due to the cost of clothius has none VD OVER \$0%.

Well, What Of M?

1. Production, under the inflamos of urious

lines to the resolves of others. Resolves phalarced 2. More or loss verdoon post V. I Day wore. increases, promoted by the federal government.

2. While as a whole thestoon route after taxes, see at the highest point in history" (due the profits of different industries, Score key in-

were and production, which has resulted in decisively to a major business upset, The most striking example of the distortion of production by controls was, of course, that provided by

a metropolitan most famone at a time when beef dence of sports elethes, are to shorture of spore examptal clothers reads from the same kind of cloth-Successive abortages of critically important products restroial shortages. But a major contributor is unbles and abut-downs while waiting for parts.

Wage Complications While price controls, unevenly smalled, have

shoreted werehorston first this way and then that the ation by reconsting uniform were rate increases without regard to varying espacities to pay them. The createst carrie contribution to this distartion

onsecceptally trying to module the dispute over steel wages hast farmery be reconsecuted a wage rate increase of 10% cests an hour. Intranduately that is increase was accepted by expanned labor as par fee the first round of wage afficiences, having the same

tion of the Withe Heuse Itself. The gence then became to beind pay.

But the capacity of different industries to pay was increases writed greatly. During the was some had helved their pay much more than others. Moreover, in some industries wages are a much larger elecant of total cost than in obsert. In 1929 (and was for which ferumes are prohibited waters much

year for which figures are available) wages ranged all the way from 30% of tails also in capacite mentilaturing to \$4.5% in businey manifestures and \$6.25% (for wages and salaries combined) in not cool market. Under those directionations, none industries were far less able to meet a mifferni wage housans ton othern. Neuroliteies, many of them had uniforms ware

increases imposed upon them. Then the price hil was beld firm. Thu, coupled with material shertupes and production difficulties which also choled output, agueezed the posits right eat of those industries. A Study In Contrasts

Sense of the most Important reduction are making Halfe or to yelfer which they brang dong on a production whitma which fash to next occursor needad prevents interested of anxiotism efficiency. The notworklet Inflatty affined one completure medium, the properties of the production of the conceptipment in part soline. All of them are emissibly important. Many other lines of business, of comes, one extremely portlank. For example, the spridt of a group of large modul stems were 16/5 larger than age, the approach of a group of anxiotism protesse senrange, the approach of a group of anxiotism posture sen-

In the measurine, the workers in some of those browgerful industries are in an bed of coast. The increases in the cast of Diving alone 2341 in more contributing the measurement in the health ways on the of workers in a smaller of industries, where ways or that have not been as much as which we have been as much as with in the work in the contribution of the property of the contribution of the property of the contribution o

Such discussions obviously create pressure in the make of these workers for smother round of wage increases. But as long as the profit remains spacesed out of their inclusives wage increases, if any, must be translated either into higher prices, or, if the povernment sets tight on the price left, man lesses which will discounte production and ultimately out workers their sche.

What To De?

Salvation both for the workers and for engigeres in the relatively grotifiens section, a pocularly inspectant group of industries, sunt to belood for prisonably by increasing productivity, thereby decreasing the cost per unit. Text of this higher preductivity cancer once only from Salvathumi efforts of the workers themselves. Acceler part can come from an estimation of bodifereach is maximized and parts within prevent the labor force from realing sources of the control of the productive of the control of the productive of the pr

comman problem. Util productivity has been thus increased, it is hard to think how the federal government could do a generic deservate both to lather and to including that to repeat its performance of presenting a undersormant and stage increase. With the present despitates of the automat electron, some industries might night this next us advance for their stinde,

White sensitive [8th the Fajoir personsion of team sensitive and the Fajoir personsion of team sensitive and team of a primary depositive to relieve distinctions conside by the sensitive sensitive contribution processing prices control. Attention has prove a control, primary prices control. Attention has prove a basing register (appear) to price and the state of the processing the sensitive prices and a 25% formers in Industrial prices, suggested (appear) to price and a 25% former in Industrial prices, consecues policy. Net electrical clean depols in more superiors than expediting the detectrical of influential prices, Sucha a control is deally control in subservation.

Business and labor both want a mutained prosperity in which all will above. Statismed prosperity conbe achieved only if we elizants the distortions in wages, prices and profits which now resteats so much vital conduction.

James M.M. Grans. Jr.
President McGrans-Hill Publishing Company, Inc.

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AVIATION'S ENGINEERING DATA BOOK

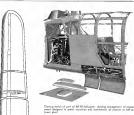
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ALIATION: Navagber, 1948





Decides Arcroth Company specifications for the 3000 are hydroxic outsits of the DC-5 include the Yoriskie Yolune Rigton Type Purios which corp-William and about their In the main Epistoric system, the Vicker's engine-deless. Combact Development Type, Person Says. and very high volumetric and over-all efficiencies. would be Voken Materians serves in an addi-

DOUGLAS DC-6 uses VICKERS 3000 psi HYDRAULIC EQUIPMENT

> noticely deliver the power and speed wantiers. The Yakers Hedroylic Motors have both starting and running forque. The very low inertio of their Voter Buildin 46-41 gives additional date about the most complete fine of 3000 psi fortreals.



ENGINEERS AND BUILDERS

ATLATION Number, 198

Phenton view of G & A (Firettona) X8.98 hall

Phonton view XX-93 fuel system, shawing (A) engine gage. (II) feel quentity gage. (C) feel gage pump IDI priver outure IDI marture fever, Sever to extrate vobble owno KGI, 941 full owno



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not showing operation motel and wood contraction. In this directly to upper site. This upper surface in shown here, comprises years and plus with anyther plus







each of two boies of a disphrages mountaing plan-Fig. 1 shows the operator about to lead and classo the Fig. 2 (Nestretes the machine midway in the broughtne cocle. Fig. 2 shows the most automatically awared as the and of the broaching steolie. Becombes are reserved to "up" position before next part is loaded. The correless unlosding

A typical job, performed on a standard Assertion

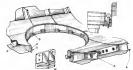
T-6-26 broughting anothing, is broughing there sales up





Awo Locaster floor construction over borels bely, with freet pare at IAI, top also of floor (I), typical leta-cetal (C), and Remé bay door kings chemal at (D). Typical floor cost resentor is shown at (E) and leaves the floor at (E). See i says bettern boom as (C) floorpero at (H); and seer uper at (E) things on the cost of the c







Warren McArthur Roll Call

Accovins Brasil, S.A. Aeroviss Nacionales de Colombas S.A. Air France Alaska Airlines American Airlines American Osumens Airlines

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ing a short cut to faster, more occurrenced presidention and essentially of parts.

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AVEATION, Security, 1949

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ATIATION, Number, 1900



Use Aluminum Rivets made of Alcoa Alloy

Pitteburgh 19. Pennsylvania.

Did you leave that magnesium alloy products are assembled with eluminum rivets? usually Alone Aluminum Alloy 505. They do a seed sab under necessarible conditions of excess and exposure.

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AVIATION, November, 2006



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* SPOT CHECKING *

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we've sog the goods right beer on earth. You'll see what we seem when you besi to a step at some air field in the great Middle-West, and spethat freezes orange-end-block "66" shield. That's the sign of Phillips Avietion Products. And we believe that pame's a erroceyo for the BEST in the Middle-West, as to reconfecture and distribute a piretiful supply of UNLEADED 80 ocume guestics to all "66" sirport pumps. See

cleaner eaglest



AVIATION GASOLINE

AVEATION November, 1866 AVIATION, Normber 1944



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